Layout Composer

Layout Composer supports the creation of conceptual facility designs. Layout Composer works in conjunction with the MicroStation platform and uses the programmed area and criteria established in Criteria Composer as a point of reference and comparison during design. In this phase, the architect would determine how many stories are needed and what functions would work on which stories (blocking and stacking). Given chosen requirements such as building footprint, street appeal, adjacency, structure, building systems, form, and massing, the designer can explore conceptual alternatives to determine the best overall solution.

Wizards

Wizards are software components that operate on a discrete design task by taking criteria and user input to create or manipulate a building and criteria model rapidly, all according to generally recognized or organization-specific practices. A Wizard extends Building Composer functionality and knows how to use the criteria data expressed in Criteria Composer to create or analyze something in a useful way. A simple wizard might be one that determines the number of parking stalls required for a building with a particular building occupancy level, based on an

individual organizations standard design criteria tables and algorithms (below). A few wizards currently under development are an IFC file export to the Parametric Cost Estimating System (PACES), export to the Blast Effects Model (BEEM), design analysis and other documentation wizards.

Status

The primary Building Composer tools: Criteria Manager, Criteria Composer, Layout Composer are currently available for use. The ability to produce programmatic cost estimates using the PACES Wizard will be available for validation starting in January 2003. Documentation wizards for DD1391 type information and Request for Proposal will be available Spring 2003. The Sustainable Designer's Aid will be available for use in January 2003. The *Building Composer* web site gives further information.
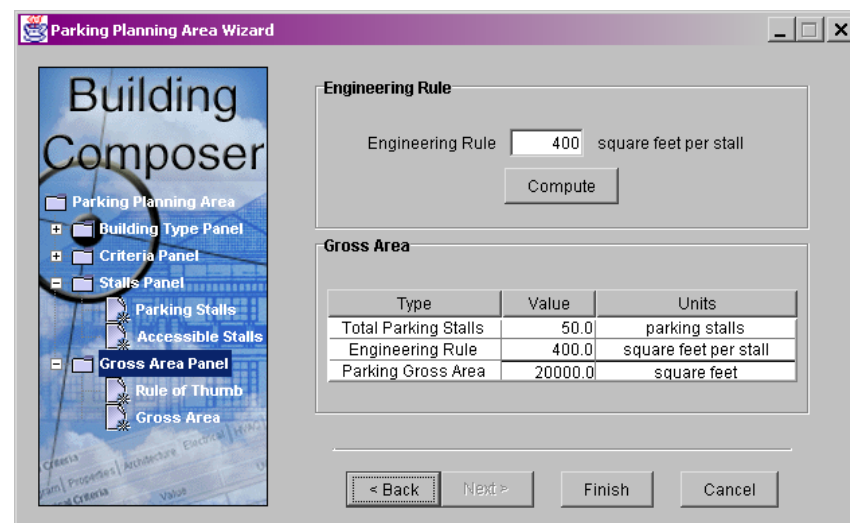
Links & References

Building Composer: http://bc.cecer.army.mil/

Fort Future: http://bc.cecer.army.mil/ff

IAI: http://www.iai-international.org/

BLIS: http://www.blis-project.org/

USACE Headquarters Engineering & Construction News (Volume IV, Number 6 Aug/Sep 02 Notes): http://www.usace.army.mil/inet/functions/cw/cecwe/notes/

US Army Corps of Engineers®

Engineer Research and Development Center

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Building Composer's Parking Planning Wizard uses standard design criteria tables and algorithms to determine the number of parking stalls a building requires, based on building occupancy.

Building a Computable Facility Model

Background

The Architectural Engineering and Construction (AEC) industry has been making a substantial effort over the past several years to create a standard facility modeling format that better enables their different software applications to work together. This emerging standard, known as the Industry Foundation Class (IFC), is being developed by the International Alliance for Interoperability (IAI) and can be found in recent releases of commercial AEC software.

With the evolution of this facility modeling standard, the ability to capture criteria and requirements during planning and design and then reuse this data during the li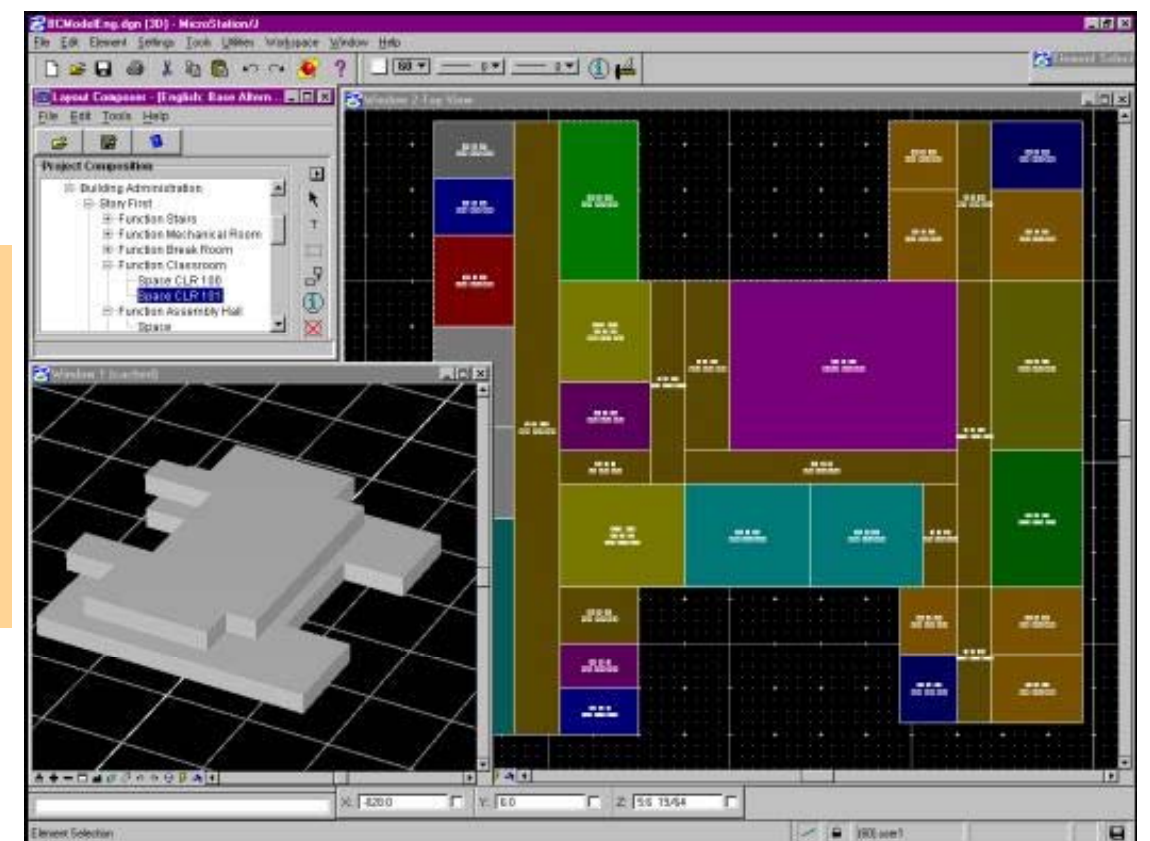fe cycle of the facility is now possible. Providing interoperability among planning, design, construction, operations and maintenance, and recycling software applications will reduce the time necessary to process information about the facilities.

This research effort is part of the "Fort Future" program being conducted by the U.S. Army Engineer Research and Development Center (ERDC) in support of the Office of the Assistant Chief of Staff for Installation Management (OASCIM) and the Installation Management Agency (IMA). The key objective of Fort Future is to develop a capability to model, simulate, assess, and optimize installation capability to support the Objective Force. Users of Fort Future, at the installation, regional, or national level will be able to set up planning scenarios, conduct dynamic analysis over a period of up to 30 years, and compare scenario results using a virtual installation.
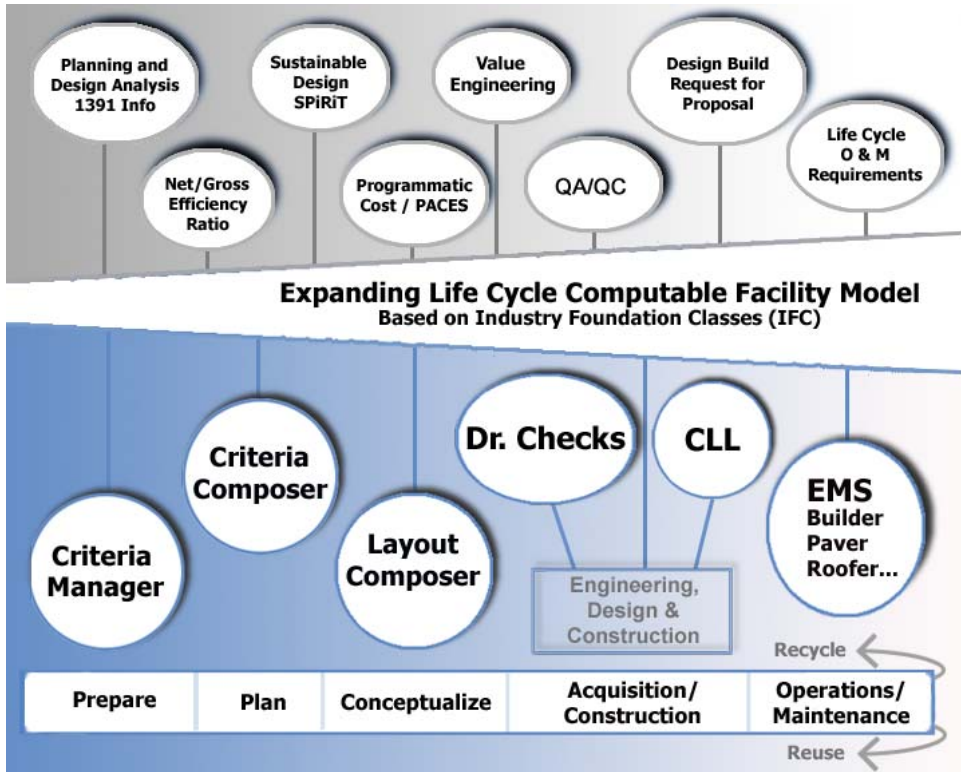
Problem

Before Objective Force brigades can be deployed, installations must conduct analyses to determine their facility requirements. The difficulty of this task is

The goal of *Building Composer* is to manage Army and customer-specific computable facility requirements and criteria, and structure them into an industry-wide standard facility modeling format.

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14. ABSTRACT
The Architectural Engineering and Construction (AEC) industry has been making a substantial effort over the past several years to create a standard facility modeling format that better enables their different software applications to work together. This emerging standard is known as the Industry Foundation Class (IFC). With the evolution of this facility modeling standard, the ability to capture criteria and requirements during planning and design and then reuse this data during the life cycle of the facility is now possible. Providing interoperability among planning, design, construction, operations and maintenance, and recycling software applications will reduce the time necessary to process information about the facilities. This research effort is part of the "Fort Future" program, the key objective of which is to develop a capability to model, simulate, assess, and optimize installation capability to support the Objective Force. Users of Fort Future, at the installation, regional, or national level will be able to set up planning scenarios, conduct dynamic analysis over a period of up to 30 years, and compare scenario results using a virtual installation.

15. SUBJECT TERMS
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Expanding Life Cycle Computable Facility Model
Based on Industry Foundation Classes (IFC)

The *Building Composer* Suite consists of:

Criteria Manager, Criteria Composer, Layout Composer, and associated wizards.

With increasing customer demands and less time and money to produce effective planning documents, *Building Composer* will help you be "on target for building excellence."

compounded by the fluid state of information about the Future Combat System (FCS) and the long lead-time (5 to 7 years for large facilities) built into the Military Construction, Army (MCA) and National Environmental Policy Act (NEPA) processes. Installations designated for Stryker Brigade Combat Teams (SBCTs) have been overloaded with requirements to produce large numbers of planning documents in a very short time. Under the Unit Set Fielding process, future combat systems cannot be fielded until supporting facilities are in place, adding yet more pressure on the MCA process.

Approach

A Facility Modeling component of Fort Future, called the *Building Composer* will shorten the time required to acquire facilities while ensuring that Objective Force and FCS criteria and requirements are met. *Building Composer* tools support capturing and tracking of facility criteria and requirements, planning and design charrettes, and associated planning and design analyses.

Benefits

Building Composer will enable users to:

- Download libraries of criteria/requirements from the Fort Future web site.
- Construct a building "architectural" program with associated criteria/requirements.
- Analyze alternative facility designs using multiple view representations such as 3D, mass modeling, bubble diagramming, and color by function.
- Create a facility object model from criteria/requirements using the industry-wide facility modeling standard, Industry Foundation Class (IFC). This standard model can then be used by commercially available Architecture, Engineering and Construction (AEC) software for further design development.
- Check the building design for sustainability using the Sustainable Project Rating Tool (SPiRiT).
- Obtain a programmatic cost estimate using the PACES parametric cost estimating system.
- Create a DD1391 design analysis planning document.
- Produce request for proposal documentation for use in the design-build process.

Tools

The primary tools in the Building Composer application suite include:

- Criteria Manager, a web-based application that helps in the development of corporate and building specific criteria libraries
- Criteria Composer, which helps users create an architectural program and to set values for project specific criteria
- Layout Composer, which helps the user create 3D conceptual facility designs
- Wizards that provide support for various discipline specific issues and assist in the completion of individual design tasks and calculations.

The Building Composer tools interact among themselves and with commercial-off-the-shelf (COTS) computer-aided design (CAD) and engineering analysis tools to feed into the expanding facility data model.

Criteria Manager

Building Composer relies on a customer-specific library of architectural functions and criteria from which the architectural program is developed. Each customer will be able to create and customize these libraries using the web-enabled Criteria Manager application. Those authorized use this tool to add new architectural functions, update their criteria, and notify interested parties. Criteria Manager will then export the criteria library in an XML-based format for use by the Criteria Composer.

Criteria Composer

Criteria Composer (below) is used to develop an architectural program and to add and set project specific criteria. This includes traditional information such as the total project area and allocation of area to specific architectural functions such as circulation and offices. It also contains discipline-specific criteria such as requirements for structural, electrical, HVAC, lighting, and plumbing. The level of detail in the architectural program varies from project to project, and can be specified as such in the system.
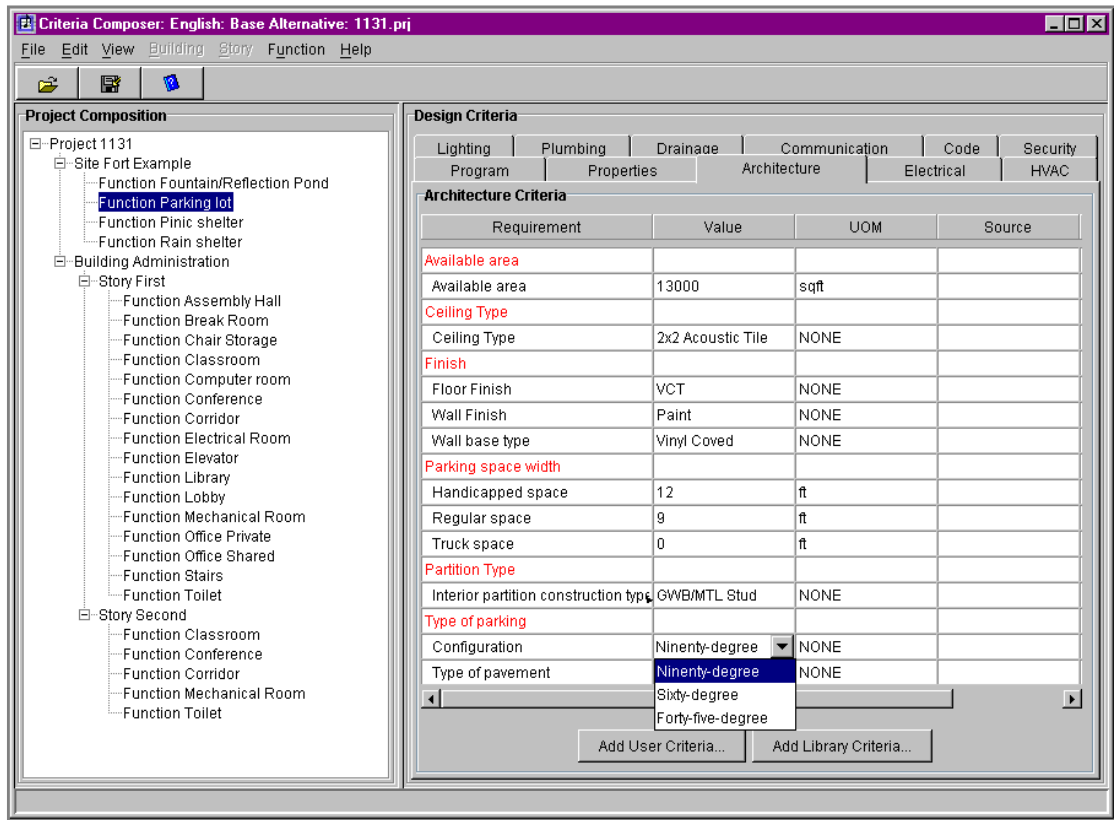
Criteria Composer helps in the development of the building program. It associates criteria and requirements to the different levels of the project: project, site, building, story and function. In doing this, the IFC model is populated.